Most of the dwellings in Bang Chan flanked the canals that stretched away from the temple area. All houses were in sight of one or more other houses, if not standing side by side. Here and there they formed small hamlets where kinsmen tended to live in proximity. Around the houses were kitchen gardens and threshing floors, and behind them, the fields. Bananas grew abundantly; pineapples, mangoes, and other fruits occasionally. The canals were full of water-vegetables, cultivated or wild, while fish were plentiful. Water sources were the rain, kept in large jars; artificial ponds dug near the houses and fed from ground water; and the canals. No wells existed. The large tile roofs of the temple collected a good deal of rain-water which was available to anyone during the hot season when all water ran low.

General Nutritional Level

The population was physically well-formed with few physical deformities evident. There was little obesity or emaciation. The daily diet (cf. Hauck, et al.:passim) consisted of large quantities of rice, with small amounts of fish, meat, vegetables, fruits, spices, and eggs. Food at the not-infrequent festivals was rich in meat, eggs, and sugar. No milk was available except canned imports, and little was used. "Nevertheless, though caloric deficiency ('hollow hunger') was not prominent, over half of a sample of the population inspected medically had one or more signs of malnutrition. Even in a group chosen for research reasons for apparently good nutrition, about one in four had some such sign and in another group, selected for evidence of poor nutrition, two out of three persons had such."[2] The nutritional level in Bang Chan did not always correlate absolutely with economic level, for nutritionally one of the poorest families was found to be one of the best fed because the father did so much fishing and collecting of green canal vegetables. The change-over, some decades ago, from home pounding of rice to steam milling by most families had probably been a major factor in increasing nutritional deficiencies throughout the community.

2. Dr. H.M. Hauck, personal communication, 1959.

GENERAL DESCRIPTION OF FAMILY FARE IN BANG CHAN

261 701 731 133 226 146 145 141 As we turn to a detailed description of the family fare, we should like to point out that starvation was unknown in Bang Chan. Although much room remains for improvement in diet, "hollow hunger" was uncommon. In the few times when disastrous flood destroyed the year's crop, the government was able to provide enough rice so that it need not be rationed. People still ate their fill. Even floods had their advantage: one could fish out the window. That gross caloric undernutrition was rare was borne out by examination of the school children (Hauck, 1956). "On the average . . . Bang Chan children could not be considered as markedly underweight. Few were so thin that one could 'count their ribs' and still fewer would be considered plump by American standards." In a random sample of village households that included about 10% of the population, the heaviest man weighed 69 kg. (151.8 pounds) and the heaviest woman 70 kg. (154 pounds). We noted no more than half a dozen adults who appeared to be "overweight." Most were middle aged or older, and none of them did strenuous field work.

Sources of Food

Home Production, Storage and Preservation

262 256 251 [26] Rice. - Rice is an essential part of any Thai meal. The majority of the rice farmers in Bang Chan had rice for home consumption milled for them at Minburi. In general, they took their own paddy to the mill, and brought the resulting milled rice home, where it was stored in a box or mat-bin. Although, according to a recent survey (Goldsen and Ralis, 1957) nearly a third of the households owned a home rice mill, undermilled or home-pounded rice was not widely used in Bang Chan. Information on this point was obtained for 333 of 336 "kitchen-unit"[1] households in the village. Of these 5 consumed home-milled rice only, 51 used home-milled rice in major part, 73 in minor part, and 199 not at all.

221 256 505 256 In households where home-milled rice was used, during June enough would be pounded to last until harvest, at which time hands were sore and bleeding from the field work and home pounding was impossible. At the time when data for the present report were being gathered, most families took paddy to the mill when water in the canal was high enough so that it could be transported by boat. If a farmer on a subsidiary

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[292] 1. In some large houses, two related family groups lived together but maintained separate kitchens.

canal misjudged his needs for milled rice and ran out, he had to mill his own paddy. Since the main canal was deepened in 1953, year-round transportation of rice by boat has been possible for many more farmers, and this may further decrease the consumption of home-milled rice.

Of 105 households which had and used a home rice mill, 99 used the polishings for feed but no family in Bang Chan used them for human food (Goldsen and Ralis, 1957). One farmer, headman of a hamlet, who lived near the main canal and the road to Minburi but who used home-milled rice, offered as the reason that the polishings were good chicken feed, and if he took rice to Minburi to be milled, the miller would keep the polishings.

As reported by Janlekha (1955) consumption of milled rice in 106 households amounted to about 285 kilograms per capita per year or 780 grams per person per day. Such "household consumption" includes "losses to pests and poultry, daily gifts to priests, contributions to temples and outlays for feasts and rites in undetermined but considerable amounts" (Sharp et al., 1953, pp. 265-266).

Flesh Foods Other than Fish. - The people of Bang Chan had a taste and appreciation for flesh food, but the production and use of meat was certainly inhibited by Buddhist tenets which prohibited the taking of life.[1] Killing of poultry, fish, etc. was tolerated among the relatively young, but was considered unsuitable to the aged who should be preoccupied with living virtuously. People felt, however, that the sin of taking life was condoned if they offered part of an animal to the priests.

Since many villagers were unwilling to slaughter buffaloes even when they become aged and useless, such animals were commonly kept until they died. Animals which had died of old age or disease were not, however, regarded by Thai Buddhists in Bang Chan as unfit for human consumption. Usually they were cut up and given to the priests. When the buffalo belonging to one family (Household 67)[2] participating in the dietary survey died, some of the meat was used fresh for curry, much

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1. Meat such as water buffalo and pork as well as fish was sold by venders. Since meat was relatively expensive and was usually used in small amounts with other foods, it was offered for sale in chunks which no longer resembled the living animal. Seeing such small quantities spared the sensibilities of the Buddhists who were thus removed a step from the killing. Actual butchering was done by Moslems or Chinese who did not object.

2. Households were identified by numbers assigned by lot.

Table 5. Diet Classifications for 75 School Children in Bang Chan, and Percentage of Children with Each Diet Classification who Missed Lunch

(Adapted from Thorangkul, 1957)

Diet classification[1]	Percentage of children	Percentage of children who missed lunch	
Class I	8	Boys	46
		Girls	45
Class II	61	Boys	73
		Girls	68
Class III	31	Boys	81
		Girls	98

1. See text for basis of classification.

vegetables eaten, since items from these two food groups were not commonly eaten as snacks. Note, in the illustrative records presented in translation (Appendix A, p. 98), that the child whose diet was considered to be in Class III did not eat a regular lunch on any of the six days for which records were available, whereas the child whose diet was classified as I ate a regular lunch six times out of seven.

Family Food Shared With Others

Throughout the year families prepared especially good meals for persons who came to work cooperatively with them. Every rice-grower entertained his cooperative harvest crew, some the transplanters. Hired laborers were not usually served such feasts, but the conviviality of the harvest season called for a round of liquor even for them. One harvest dinner for 48 cost 50 baht, plus eels (60 baht) and rice. Cooperative home pounding of rice was still practiced in some households and thought to be fun. In one day enough rice to produce 40 tang (640 kg.) was pounded by groups of 15 to 20 workers; in an evening 20 tang were done. If 40 tang were milled, workers were served a full meal; if 20 tang, a dessert only. Other occasions were fish-pond draining, house raising and repair. Each participant in the fish-pond draining at Household 21 was fed (3)khaaw (3)tom (soupy rice) for lunch and "an enormous supper," in addition to receiving the traditional pot of fish. If good food were not served at these functions people

511 appeared to account in large part for the greater cash expenditures of some families than others. Thus Household 25, with the highest total and per capita cash expenditure for food among these 11 families, consumed a larger quantity of meat than others, and often bought beef, which was the most expensive item purchased. This household bought fruit, meat, and vegetables from venders almost every day. They said [857] [867] "Some do not pay money to buy food, but pick or get it from the canal or gardens --this family cannot live like that because they come from a rich family and cannot live on poor food, so most of the money goes for food." The husband said "I cannot work on poor food." In Group A, Household 12, which had the highest per capita food expenditure, had little home produced food. The wife, who went to Bangkok often, usually bought food when in town. Household 2, with a total cash expenditure for food higher than others, did not have pork or beef on survey days, but ate more (1)plaa (1)thuu, a sea fish which is purchased.

433 511 Home Production of Food. - In keeping with the general pattern in the community, the families surveyed produced most of their own food.

243 [465] Rice. - The hired laborer received rice as part of his pay, but all other families produced their own. Seven households used polished rice exclusively (Table 9). The only one 256 [262] to use home pounded rice in major part was Household 103. This family lived near a little canal which was dry in summer, so they were using home pounded rice when visited toward the end of March and in mid-July (Rounds IV and I). When the observer came in January (Round III), transportation of rice to the mill by boat was possible, but the family members had little farm work to do and were willing to spend some time milling rice. This family, which lived in the home-milling area (see p. 40), took rice to be milled only during the harvest season when they were busy, and the level of the canal was still high. The families which used home pounded rice in minor part did not live in the home-milling area, and apparently milled rice at home only when they were unable to get to the mill by boat.

844 [856] [845] Fruits and vegetables. - Although the Thai government has attempted to encourage kitchen gardening, few vegetables and fruits were produced by the families which cooperated in the dietary study (Table 10). All families grew bananas, and certain common ingredients of curries: chilies, bergamot, galangal and lemongrass. No other plants were grown by as many as half of the families studied.

[872] 262 Of the edible plants which grew wild, swamp cabbage was used by 7 families on 11 of the 44 survey days. Bamboo shoots, the white flowers of the West Indian pea tree and yellow (2)sa-(5)noo flowers were used by 3 families on one day each;

Table 9. Use of Home-milled and Polished Rice by Households Participating in the Dietary Study

Group and Code No.	Round of Dietary Study[1]							
	I		II		III		IV	
	HM[2]	P[2]	HM	P	HM	P	HM	P
Group A								
2		x		x		x		x
12		x		x		x		x
67	x			x		x		x
103	x		x			x	x	
215		x		x		x		x
222		x		x		x		x
Total No.	2	4	1	5	0	6	1	5
Group B								
16	x		x			x		x
20		x		x		x		x
21		x		x		x		x
23		x		x		x		x
25	x			x		x		x
Total No.	2	3	1	4	0	5	0	5

1. For dates, see Table 7, p. 58.

2. HM and P stand for home-milled and polished rice respectively.

truffles were used as snacks on 2 occasions, and (1) bauaun, (2)phag (2)tob, lotus stems and lotus seeds, the latter as a snack, were used once each. The two groups of families appeared to grow fruits and vegetables and to gather edible wild plants to about the same extent. Two families, one in each group, raised mushrooms during the period when farm work was slack.

146 most significant source of phosphorus, iron, thiamine, ribo-
262 flavin and niacin in these diets. Although the calcium content of rice is lgw[1], about 23 and 16% of the estimated calcium content[2] of diets of Groups A and B respectively came from the cereal groups. Glutinous rice and various products such as noodles made of rice flour were eaten occasionally in small amounts. These and other cereals and cereal products, such as wheat bread and popcorn contributed little to the total nutritive value of the diets.

Animal products other than pork fat. - Fish and other foods of animal origin furnished about 2/5 of the protein in the diets of both groups. From 20 to 30% of the riboflavin and niacin and substantial amounts of phosphorus and iron were provided by this food group, also. For families in Group A, these animal products provided substantially more fat than the group of fats and oils as such, whereas Group B obtained about the same amount of fat from these two food groups. The estimated contribution of vitamin A from this group was small. Specific analyses for most of the varieties of fish used in Bang Chan were not available, however, hence many calculations were made on the basis of average values for "fat fish," "lean fish," and "dried fish."

Although a substantial part of the calculated calcium content of the diets came from animal products, the amounts were only about 8 and 9% of the estimated allowances for Groups A and B respectively. Fermented fish are reported to contain 1126 mg. per cent of calcium (Knudson, 1955) but the amounts eaten were relatively small. Two families only in Group A used a total of 217 grams of fermented fish on survey days, and two families in Group B used a total of 608 grams. These amounts, though they represented servings of only 20 grams per person for the two families in Group A, and of 36 grams per person for those in Group B, nevertheless increased the estimated average calcium intakes substantially, so that 43% of the calcium in diets of Group A, and 34% in diets of Group B, were provided by animal products. The tiny dried fish which are eaten whole, were not used by the families studied on any of the 44 survey days.

On the average, the contribution of animal products other than fish to the nutrient content of these diets was small.

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[256] 1. According to Knudson (1955), addition of calcium carbonate to rice during the milling process was not practiced in Thailand.

[ ] 2. No attempt was made to estimate calcium intake from betel chewing, although this might be considered a dietary source of calcium. Six of 15 persons twenty years of age or older, in Group A, were betel chewers, whereas among 14 persons over twenty in Group B, 9 chewed betel regularly and one occasionally.

000 First steps toward a better diet are suggested by the best dietary practices observed. Although the calculated intake of no family on any survey day approximated or exceeded the estimated allowances for all nutrients, sharp contrasts were evident in individual records. Two sample calculations in Appendix C (pp. 121-122) represent one of the better and one of the poorer records obtained. The food for Household 12, on Jan. 14, 1954 consisted chiefly of polished rice, fish, and non-leafy vegetable, with seasonings. In contrast, on July 23, 1953, Household 16 used home-milled rice, and about 60 gm. per person of swamp cabbage, with other vegetables and fish. These choices enhanced the potential nutritive value of the diet markedly without increasing its cash cost. Family labor was involved, however, in gathering greens and milling rice.

262 592

000 Since rice is the chief solid food for all ages, improving this major item will be considered first. An important step would be to teach the people to cook rice with just enough water so that all would be absorbed. The Thai government has sought to encourage this. So long as the practice of cooking rice in excess water persists, much of its vitamin and mineral content will be discarded, and efforts to improve the nutrient content of rice will be largely nullified. Some rice water could be used as a beverage, and for cooking certain vegetables which are commonly served with a thickened sauce. This would be preferable to discarding the rice water, but encouraging its use must be considered as an alternative to cooking rice without excess water, since the two practices are mutually exclusive.

[252] [146]

[146] [256] Use of under-milled and processed rice, and of the rice polishings, has the advantage that a large part of the original B-complex content is conserved, whereas vitamins for enrichment are at present imported, and are apt to be for years to come. Since home milling persisted to some extent in Bang Chan, it might be encouraged, in some families. One highly respected headman continued to mill rice at home, hence the "prestige value" of white rice may not be so important in Bang Chan as it is among city Thai, who sometimes regard undermilled rice as "prisoner's food." The time and effort involved in home milling, however, may deter those who have given it up from returning to it; and since deepening the main canal has made the mill accessible to more families the year round, a program based on the assumption that commercial milling of rice will increase is probably more realistic than an attempt to encourage the return to home milling where it has been abandoned.

[256] [554]

256 At present, no processed rice is made in Thailand. A plan to buy and install a Malekizing plant to process rice for the Royal Thai Navy was announced in 1953, but the plan has not materialized. Enriched rice has been sold by the Thai Rice Company for some years, but the best grades only,

90 to 100% unbroken grains, are used. To benefit rice farmers, enrichment should either be done at the nearby mills, or premix sold locally, and farmers taught to mix it with their own rice. Because the premix used and marketed by the Thai Rice Company contains riboflavin as well as thiamine, niacin and iron, the treated grains can be readily distinguished from ordinary rice. Enrichment at the mill would be convenient, but would probably entail some government supervision and would not automatically ensure a better nutrient intake unless people learned the value of the conspicuous yellow grains. From this standpoint, separate purchase of premix might have advantage, at least in the initial stages of the program.

As far as we know, use of rice polishings in preparing "with-rice" dishes has not been explored in Thailand. Incorporation of rice polishings into a variety of soups and other "with-rice" dishes which would be acceptable to the Thai palate should not be difficult for the Thai home economist interested in experimental cookery. Nutrients usually lost in milling could thus be returned to the human diet. If adopted this procedure could be effective even in families that cling to the customary method of cooking rice in excess water. One old lady with beriberi, whose doctor had prescribed rice polishings, said she found them tasty. Information on the health value of rice polishings would probably be received more favorably if homemakers were shown acceptable ways of using them. A watery extract of the polishings might be used as a stop-gap preventive of thiamine deficiency while the slow process of changing food habits is going on. Such an extract could be used as a strengthening medicine for women during pregnancy and lactation, for infants and young children, and for those doing heavy field work, i.e. for vulnerable groups. The "second class doctors" at Minburi, the priests who practice healing, other traditional practitioners and midwives, because of their basic desire to help, would provide natural centers of information for this purpose.

Efforts being made by Thai government agencies to encourage eating more "with-rice" and less rice should be continued. A Thai co-worker suggested that "an educational program enjoining less peppery forms of with-rice would have the effect of encouraging consumption of a larger proportion of with-rice" (Sharp et al. 1953, p. 278). Various food items including those with a hot taste, were sometimes said to be bad for children, pregnant women, sick persons, etc., but seldom was any food mentioned as being good to eat under these circumstances. The concept that hot tasting foods are not healthful might be coupled with the idea that more generous amounts of mild dishes, especially those including green and yellow vegetables, should be used instead. The most widely used vegetables in Bang Chan were the wild swamp cabbage, and (2)phag (2)ka-(2)cheed, both leafy aquatic plants. Planting more (2)phag (2)ka-(2)cheed, and liberal use of both of these plants while they are available should be encouraged.

7: Janlekha X-4,5 (1948-1953)1956 AO7 Central Thai AO7
Bangchan

243 Although private rice millers in Bangkok operate
256 with a rather high degree of collusion, in the countryside
472 the many small millers compete actively on the basis of price charged for their services or price paid for paddy or both. The comparatively high capital investment of the enterprise has rendered inter-mill competition in the countryside very intense, and it is obvious that the farmer gains economically from such competition. If somehow the government could, by a carefully conceived gradual program, induce a large number of smaller mills to move from Bangkok to the countryside, the farmer will benefit all the more. Already, the trend has been for gradual business decline for Bangkok mills and business upswing for the countryside mills.[8]

243 It is rather unfortunate, however, that the government has explicitly taken the view that small rice mills
256 (capacity of five tons and under) in the countryside are
656 detrimental to the interest of the farmer. It is officially
44 held that small rice mills would bring about a large number of middlemen who would then combine to suppress the farm price. Actually, more middlemen tend to produce correspondingly keener competition in the marketing process which is beneficial, not detrimental, to rice growers.

243 Small rice mills, which may be more conveniently
256 erected in the villages and perhaps with local capital, will
433 reduce the cost of transporting rice by a third, for about two-thirds of the weight of paddy is head rice, the other

8. The Economic Yearbook, edited by Luan Pannoi, Bangkok, 1951.

7: Janlekha X-4,5 (1948-1953)p956 AO7 Central Thai AO7
Bangchan

243 256 433 comprising the by-products of milling -- broken rice, bran, and husk. There is still a further saving when paddy is milled where it is produced, for bran would not have to be moved away from the farm as part of paddy to distant mills and then moved back again to the farm where it is bought back to be utilized as feed.

If not hampered by unnecessary government restriction, small rice mill industry will provide opportunity for local investment to which internal savings among affluent farmers may be channelized. The relatively low capital requirement and the simplicity of operation of small movable rice mills have made it possible for many Thai farmers in the northern part of the country to become successful rice millers, and there is no reason to believe that farmers in the Central Plain cannot do likewise.

Scarcity of Cash and Credit

434 4-57 An important factor contributing to the acuteness of the basic economic problem of Bangchan is the scarcity of both cash and credit in the village. Bangchan farmers receive cash from the sale of paddy in two periods -- from January to March, and from July to October. Most sales are expedited in the first period, when rentals and credit accounts are expected to be settled. Farmers also need cash for the purchase of goods they have forgone during the previous work season when they had little or no cash. Since there will be no sale of paddy during April - June when paddy cannot be moved through the shallow water level

7: Janlekha X-4,5 (1948-1953)p956 AO7 Central Thai AO7
Bangchan

APPENDIX C

REGISTERED RICE MILLS IN THAILAND

• 256 I. Number of registered rice mills in Thailand by changwad.

Changwad*	Number	Changwad*	Number
Angthong (C)	16	Patalung (S)	14
Ayuthia (C)	61	Pattani (S)	2
Bangkok (C)	49	Patumtani (C)	29
Buriram (NE)	5	Pichit (C)	26
Chacherngsao (C)	42	Prachuab (C)	4
Chainat (C)	4	Petchabun (C)	8
Chaipua (NE)	2	Petchaburi (C)	12
Chantaburi (C)	15	Pisnulok (C)	6
Chiengmai (N)	28	Prae (N)	6
Chiengrai (N)	12	Puket (S)	6
Cholburi (C)	25	Rajburi (C)	38
Chumporn (S)	8	Rayong (C)	9
Dhonburi (C)	45	Roi-ed (NE)	2
Kambaengpet (C)	5	Sakonnakorn (NE)	1
Kanburi (C)	3	Saraburi (C)	23
Khonkaen (NE)	12	Satul (S)	1
Krabi (S)	1	Singburi (C)	6
Lampang (N)	14	Samdprakarn (C)	26
Lampoon (N)	1	Samdsakorn (C)	14
Lopburi (C)	19	Samdsongkram (C)	11
Maehongsorn (N)	1	Songkla (S)	7
Mahasarakam (NE)	1	Srisaked (NE)	3
Nakornnayok (C)	16	Sukhotai (C)	6
Nakornpanom (NE)	4	Supanburi (C)	40
Nakornpatom (C)	38	Surin (NE)	6
Nakornsawan (C)	29	Tag (C)	4
Nakornsritamraj (S)	21	Trad (C)	3
Nonburi (C)	15	Trang (S)	1
Nongkai (NE)	2	Ubonrajtani (NE)	14
Pang-nga (S)	3	Udorntani (NE)	10
		Utaitani (C)	10
		Uttradit (C)	6

* Abbreviation immediately following each changwad indicates the geographical region: C, Central; N, North; NE, Northeast; S, South.

• 256 II. Number of registered rice mills in Thailand by region.

Region	Number
Central	663
North	62
Northeast	62
South	64
Total	851

III. Bangkok rice mills and their capacities (only those in operation)

Name of mill	Capacity tons/24 hrs.
Thai Rice Mill, 1	500
Thai Rice Mill, 2	350
Kwang Heng Lee	300
Kwang Hong Lee	250
Kiang Lee	230
Tai Sae	230
Chin Heng Lee	210
Nguan Hong Lee	200
Nguan Chiang Lee	185
Kwang Sun Thai	180
Chin Seng Lee	176
Long Heng Lee	165
Thai Rice Mill, 10	160
Chiang Seng Huad	160
Long Heng	160
Kwang Heng Thai	150
Kwang Sun Lee	150
Liang Huad Lee	130
Yong Chiang Thai	130
Thai Rice Mill, 7	110
Long Seng	90
Lee Heng	88
Hua Heng	84
Yu Heng Lee	80
Thai Rice Mill, 8	65
Chiang Seng Hong	60

Source: Economic Yearbook, 1954